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The Microphysics of Antarctic Clouds: what we know and what were trying to discover[1]

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Processes by which atmospheric aerosol particles such as dusts, sea salt, or black carbon interact with clouds are poorly understood, and contribute towards one of the largest uncertainties in future climate predictions in the Intergovernmental Panel on Climate Change (IPCC) assessment reports. Consequently, numerical models cannot accurately reproduce cloud fraction and lifetime, thus affecting atmospheric radiative interactions. This inadequate modelling capability is particularly problematic in the polar regions, where inaccurate radiative predictions hinder forecasts of, for example, the sea ice extent. Model development requires an improved understanding of the physical processes involved; however, a substantial hurdle in this effort is the scarcity of polar atmospheric measurements for model validation, particularly in Antarctica. By measuring cloud properties, such as liquid mass content, we can learn more about the clouds common to the region and develop a more realistic representation of their microphysical properties in models. In this presentation, I will discuss the methods by which we now make aircraft measurements of clouds and aerosol, and introduce the models we are using to try to understand our observations. Measurements from the Microphysics of Antarctic Clouds (MAC) campaign - conducted in the Weddell Sea, Antarctica - will be shown to illustrate the key questions we want to answer.

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